REMARKS

The Examiner has indicated under Disposition of Claims that claims 1 - 44 are pending in the current application. However, claims 1 – 35 were cancelled upon filing the divisional application as noted in the Application Transmittal Letter (copy enclosed) dated March 31, 2004. A refund of fees charged for additional claims is hereby requested if applied to the divisional case. New claim 45 is added. Accordingly, claims 36 – 45 are presently pending in the application.

Specification

By way of the foregoing amendment, Applicant hereby provides priority data of the current application.

Objection to the Drawings

The drawings have been objected to as failing to illustrate "sub-bodies" (as disclosed in the specification at, for example, page 4, lines 1-8).

Applicant tenders a Replacement Drawing Sheet for FIG. 3, which labels a sub-body as "42". This structure is disclosed in the specification and no structure has been added to the figure. No new matter has been added by the addition of this reference numeral.

Double Patenting

Claims 1-35 have been rejected under 35 U.S.C. § 101 as claiming the same invention of co-pending U.S. Patent Application No. 10/202,401. Please note that the Transmittal Letter accompanying the divisional patent filing dated March 31, 2004 requested the cancellation of original claims 1-35. So that there is no confusion, claims 1-35 are hereby cancelled, thus obviating the rejection.

Claim Rejections – 35 U.S.C. § 112

Claim 41 has been rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement, namely that the wafer sensor structure as claimed is not enabled. It is Applicant's view that the wafer sensor structure would be well-known to someone skilled in the art and submit as evidence example sensors capable of optical position detection. Attached herein are two articles in this analogous field to demonstrate that one knowledgeable in the art can use the components disclosed in these articles to make and/or

IN THE DRAWINGS

The drawings have been objected to under 37 C.F.R. § 1.83(a). FIG. 3 has been corrected in compliance with 37 C.F.R. § 1.121(d). Applicant submits herewith Annotated Sheet Showing Changes and Replacement Sheet.

use the invention. The first article is an Omron sensor brochure which shows typical sensor assembly structures and applications. The second article is a SMC Pneumatics catalog showing a sensor structure attached to an actuator. Reconsideration and removal of the §112, first paragraph rejection is thus hereby respectfully requested.

Claim 40 has been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter. Claim 40 is now amended to clarify the claim, specifying that sensing includes the "presence and position" of the wafer. Removal of the rejection is thus respectfully requested.

Claim 42 has been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter regarding which wafers are sensed. Claim 42 is now amended to include the limitation wherein the peripheral zone of "each" wafer proximate the hand is optically sensed. Removal of the rejection in light of this clarification and amendment is respectfully requested.

Claim Rejections – 35 U.S.C. § 102

Claims 36 – 39 and 42 – 44 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Cameron, et al. (WO 00/02803; hereinafter "Cameron"). Claims 37-39 and 42-44 depend directly or indirectly from claim 36. Because Cameron does not teach all of the elements as set forth in claim 36, and therefore in claims 37-39 and 42-44, Applicant respectfully disagree with the rejection.

Claim 36 recites *mechanically grasping a selected number of wafers by a corresponding number of blades....* In describing the disclosed robotic hand, Applicant expressly stated that "As used therein, 'mechanically' grasping refers to wafer engagement by other than by application of pneumatic force directly to a surface of a wafer." (Patent Application, page 3, lines 6-8)

Cameron does not teach mechanically grasping of wafers step as set forth in claim 36. Instead, Cameron utilizes a vacuum wafer grasping mechanism wherein vacuum suction is used to secure the substrate to the paddle. (Cameron, page 5, lines 17-20, 26-28, 30-31, page 6, line 1) This type of pneumatic force is explicitly excluded from the definition of mechanically grasping as set forth in the present application.

More importantly, Applicants have determined that are two significant advantages to use mechanical grasping over vacuum grasping in wafer handling process. First, mechanical grasping introduces less contamination. The vacuum end-effector relies on the end-effector surface area in contact with the wafer to produce a lateral (parallel to wafer surface) friction

force. This contact area and the associated micro displacement (vibration, slippage) produce particles on the backside of the wafer. When wafers are processed in wet tanks (cleaning processes) the backside particles can migrate to the front side where the chips are located. These particles would cause failures and decrease manufacturing yields. On the other hand, edge grip end effectors have minimal contact area and thus minimal particles are produced. Based on our measurements, an order-of-magnitude analysis shows vacuum end effectors produce 10,000 particles and edge grip end effectors produce 10 particles per grip. Second, while edge grip end effectors have a known constant grip force based on the pneumatic force of the gripping actuator, vacuum end effectors grip (friction) force is less known or constant. The vacuum grip force is highly dependent on the surface roughness and the co-planarity of the end effector and wafer. The variability of the vacuum end effector grip force does not make the vacuum end effector a good candidate for multi-plane wafer motion. In addition, the vacuum end effector relies on the friction force between the end effector and wafer surface to produce a lateral (parallel to wafer surface) friction force. When the robot arm is accelerating in the horizontal plane with a horizontal wafer surface or when the robot arm is moving in the vertical plane with a vertical wafer surface, there are forces acting on the wafer may be greater than the lateral friction force, which could cause wafer slip and damage.

Since mechanical grasping is clearly distinguishable from vacuum grasping in the wafer handling process, and Cameron only teaches a vacuum wafer grasping mechanism, reconsideration and allowance of claims 36-39 and 42-44 are thus respectfully requested.

Claim Rejections – 35 U.S.C. § 103

Claims 40 – 41 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Cameron in view of Bacchi, et al. (U.S. Patent No. 6,275,748; hereinafter "Bacchi"). Applicants respectfully disagree with the rejection.

Claim 40 recites sensing the presence and position of wafer comprises detecting a displacement of a wafer contact pad when said wafer contact pad contacts a wafer peripheral zone. Claim 41 recites that the optical sensing of wafer step comprises optically detecting a displacement of the wafer contact pad when said wafer contact pad contacts a wafer peripheral zone. Examiner alleges that Cameron discloses position and presence sensors and Bacchi discloses the step of sensing the wafer pad displacement.

Upon careful review of the prior art, it is Applicants' view that Cameron in view of Bacchi does not teach detection of wafer presence and position via wafer pad displacement as recited in claims 40-41.

The optical sensors disclosed in Bacchi are used to detect retracted, safe specimen loading/gripping and extended positions of the active contact point. (see, *e.g.*, Bacchi, Col. 2, line 22-24) The active contact point is movable between a retracted wafer-loading position and an extended wafer-gripping position to urge the wafer against the distal rest pads so that the wafer is gripped only at its edge or within the exclusion zone to reduce contamination. (see, *e.g.*, Bacchi, Col. 2, line 15-20). The active contact point disclosed in Bacchi does not perform wafer gripping functionality. Instead, Bacchi discloses that it is the proximal and distal rest pads that support and grip the wafer. (See, *e.g.*, Bacchi, Col. 2, lines 10-15)

In contrast, the wafer contact pad recited in claims 40-41 is structured to serve the wafer grasping function. (Patent Application, page 3, lines 17-18, page 2, line 26-29)

Since the active contact point disclosed in Bacchi serves a distinct function from that of the wafer contact pad recited in claim 40 and 41, detection of the positions of the active contact point is not the same as the detection of wafer contact pad displacement. Thus, Bacchi does not disclose detection of wafer contact pad displacement by detecting the position of the active contact point.

Furthermore, Cameron does not disclose wafer sensors to detect position and presence of the wafers on the plurality of the end-effectors as recited in claim 38, and thus in the corresponding dependent claims 40-41. Cameron discloses position sensor to detect location of the wafer in the cassette station.

In neither Cameron, nor Bacchi, is there a suggestion to combine the optical detection of the active control points of Bacchi with wafer detection feature from Cameron. Furthermore, there is no suggestion to use optical sensors to detect wafer pad displacement in Bacchi. Care must be made when combining references.

The Federal Circuit has been consistent in reversing the PTO when a rejection is made on the basis of hindsight, that is when an Examiner rejects the application under 35 U.S.C. §103(a) grounds as obvious under a combination of two or more patents without any specific suggestion within the patents to combine the features. In re Rouffett, 47 USPQ2d 1453 (Fed. Cir. 1998), the Federal Circuit refused to uphold an obviousness rejection, even where skill in the art is high, absent the specific identification of principal, known to one of ordinary skill in the art that suggests the claimed combination.

The Federal Circuit reemphasized the care to be taken when combining prior art references in obviousness findings in Ecolochem v. Southern Cal. Edison, 56 USPQ2d 1065 (Fed. Cir. 2000), stating that such absence of evidence to combine prior art references "is defective as hindsight analysis." The Federal Circuit held similarly in In re Kotzab, 55

USPQ2d 1313 (Fed. Cir. 2000), reversing the PTO and stating that, "[i]dentification of prior art statements that, in abstract, appear to suggest claimed limitation does not establish prima facie case of obviousness without finding as to specific understanding or principal within knowledge of skilled artisan that would have motivated one with no knowledge of the invention to make the combination in the manner claimed."

Finally, the Federal Circuit has reaffirmed their view that the PTO used improper hindsight analysis to reject patent claims under §103(a) in the recent case of In re Lee, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002), stating that a specific suggestion in the prior art cited is required and not a simple citation to "common knowledge and common sense." Lee includes a tour-de-force of case law directed to the issue of combining references including those as follows:

- "The factual inquiry whether to combine references must be thorough and searching. . . . It must be based on objective evidence of record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with." (Lee, 277 F.3d at 1343)
- "A showing of a suggestion, teaching, or motivation to combine the prior art references is an essential component of an obviousness holding." (*quoting* Brown & Williamson Tobacco Corp. v. Philip Morris, Inc., 229 F.3d 1120, 1124-25, 56 USPQ2d 1456, 1459 (Fed. Cir. 2000)
- "Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis if rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references." (*quoting* C.R. Bard, Inc. v. M3 Systems, Inc., 157 F.3d 1340, 1352, 48 USPQ2d 1225, 1232 (Fed. Cir. 1998)
- "There must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant." (*quoting* In re Dance, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998)
- "Teachings of references can be combined *only* if there is some suggestion or incentive to do so." (*quoting* In re Fine, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988) (emphasis in original)

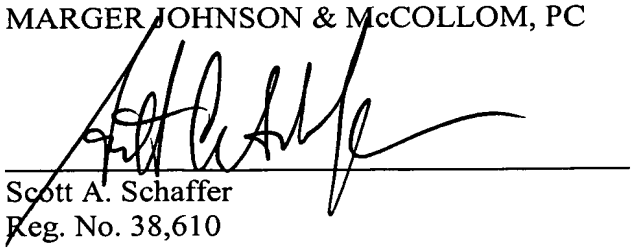
The Patent Office has failed to display the rigor required by the Federal Circuit holdings in demonstrating a suggestion within the art that the cited prior art references should be combined.

CONCLUSION

For the foregoing reasons, reconsideration and allowance of claims 36-45 of the application as amended is solicited. The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

Respectfully submitted,

MARGER JOHNSON & McCOLLOM, PC



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EE-SX77_/EE-SX87_ Series

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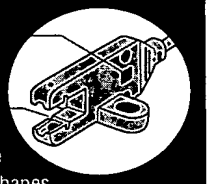
If you have resisted using

photomicrosensors (optical switches) for counting, positioning, detection, motion sensing or switching applications, you have not tried one of our photomicrosensors. Only Omron, a recognized world leader in optical switch technology, can give you superior support (short lead times, extensive technical expertise, etc.) and access to the industry's broadest line of photomicrosensors. Our latest addition, the new EE-SX77_/EE-SX87_ series photomicrosensors, are a cost-effective, easily integrated solution for various applications.

Quick and Easy Installation

- One of the industry's smallest designs, making them ideal for space-constrained applications
- Red LED indicator window that is visible from either side
- Notched optical axis indicator
- 2 meter attached cable
- Standard, 'L', and 'T' shapes for multiple mounting options
- Direct connection to Omron's suite of industrial automation products (PLCs, digital panel meters, etc.)



Durability and Performance

- Choice of NPN or PNP outputs
- Amplified output that can drive relays or PLCs
- 5 mm slot width
- High reliability and long life
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Aggressive competitive pricing

Omron's aggressive pricing program makes high technology affordable. The EE-SX77_/EE-SX87_ series photomicrosensors' per piece pricing is extremely competitive and their value increases with the quantity ordered.

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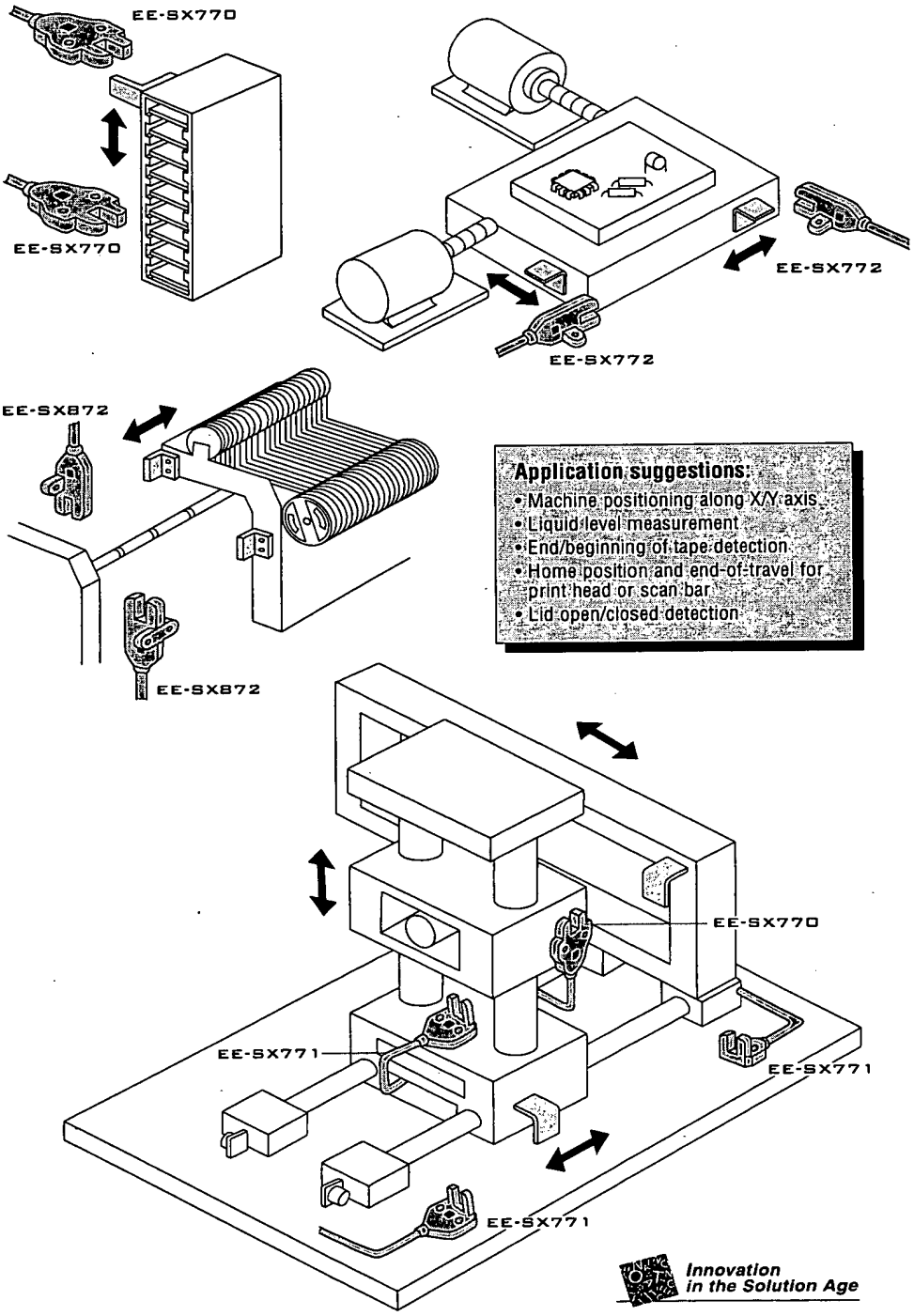
When you expect the best from your vendor, you get Omron, and that means high quality products and innovative solutions. We have some of the world's broadest lines of control components (photomicrosensors, relays, switches, etc.) and industrial automation products (PLCs, digital panel meters, etc.) giving us the resources to be flexible when solving applications. Depending on your application needs, we can either supply a single critical part or an entire suite of interconnected products.



Application suggestions:

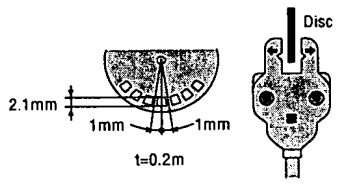
- Machine positioning along X/Y axis
- Liquid level measurement
- End/beginning of tape detection
- Home position and end-of-travel for print head or scan bar
- Lid open/closed detection

Innovation in the Solution Age

Specifications

Item	Transmissive (slotted) models							
Output configuration	Dark-ON				Light-ON			
Output	NPN		PNP		NPN		PNP	
Model	EE-SX770	EE-SX770A	EE-SX770P	EE-SX770R	EE-SX870	EE-SX870A	EE-SX870P	EE-SX870R
	EE-SX771	EE-SX771A	EE-SX771P	EE-SX771R	EE-SX871	EE-SX871A	EE-SX871P	EE-SX871R
	EE-SX772	EE-SX772A	EE-SX772P	EE-SX772R	EE-SX872	EE-SX872A	EE-SX872P	EE-SX872R
Supply voltage	5 to 24 VDC ±10%, ripple (p-p): 10% max							
Current consumption	NPN models: 35 mA max.							
	PNP models: 30 mA max.							
Slot width	5 mm							
Standard target object	Opaque: 2 x 0.8 mm min.							
Differential travel	0.025 mm							
Control output	NPN models: At 5 to 24 VDC: 100 mA load current (I_C) with a residual voltage of 0.8 V max. When driving TTL: 40 mA load current (I_C) with a residual voltage of 0.4 V max.							
	PNP models: At 5 to 24 VDC: 50 mA load current (I_C) with a residual voltage of 1.3 V max.							
Operation indicator (see note 1)	Red LED is ON when the object to be detected is not present							
Response frequency (see note 2)	1 kHz							
Light source	GaAs infrared LED with a peak light wavelength of 940 nm							
Protective circuit (see note 3)	Overcurrent protection (built-in circuit)							
Ambient illuminance	Sensing surface: 1,000 ℓx max. with fluorescent light							
Ambient temperature	Operating: -25°C to 55°C (-13°F to 131°F)							
	Storage: -30°C to 80°C (-22°F to 176°F)							
Ambient humidity	Operating: 5% to 85%							
	Storage: 5% to 95%							
Vibration resistance	Destruction: 20 to 2,000 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions							
Shock resistance	Destruction: 500 m/s² (50G) three times each in X, Y, and Z directions							
Degree of protection	IEC60529 IP60							
Connection method (standard length)	Pre-wired: 2 m							
Casing material	PBT (polybutylene terephthalate)							
Cable material	PVC (polyvinyl chloride resin)							

Note:
1. The operation indicator of models with suffix code (A) or (R) will turn ON when the light is interrupted.
2. The response frequency is a value obtained when the EE-SX detects a rotating disc with holes in it, as shown to the right.
3. Operates when the load current exceeds the rated value of 100 mA to inhibit a current flow exceeding 120 mA.



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AUTHORIZED DISTRIBUTOR:

Air Cylinder: Standard Type
Double Acting, Single Rod
Series CJ2
ø6, ø10, ø16

How to Order

Bore size

6	6 mm
10	10 mm
16	16 mm

Standard stroke (mm)

ø6	15, 30, 45, 60
ø10	15, 30, 45, 60, 75, 100, 125, 150
ø16	15, 30, 45, 60, 75, 100, 125, 150, 175, 200

- Intermediate strokes are available by the 1 mm interval with no stroke adjustment by spacer.
- When auto switch is mounted, refer to "Minimum Stroke for Auto Switch Mounting" on page 6-3-3.

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style
D	Double clevis style (Except ø6)

Cushion

Nil	Rubber bumper
A	Air cushion (Except ø6)

Built-in Magnet Cylinder Model

Suffix the symbol "-A" (Rail mounting style) or "-B" (Band mounting style) to the end of part number for cylinder with auto switch.

Example	Rail mounting style	CDJ2B10-45-A
	Band mounting style	CDJ2B16-60-B

- For rail mounting style, screws and nuts for 2 pcs switches come with the rail.

Without auto switch CJ2 [L] [16] [60] [A] [R]

With auto switch CDJ2 [L] [16] [60] [A] [R] [J79W] [ ]

- **Built-in magnet**
- **Number of auto switches**

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Band mounting style

Rail mounting style

Port location on head cover

Bore size (mm) / Symbol	6	10, 16
Nil	—	Perpendicular to axis
R	Axial foot style	Axial foot style

- For configuration, refer to page 6-3-4.
- Double clevis style is only available for being perpendicular to axis.

Auto switch

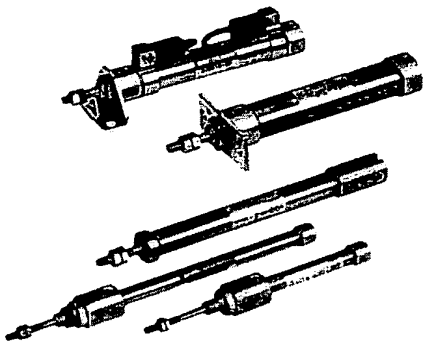
- For the applicable auto switch model, refer to the table below.
- Auto switch for rail mounting style is shipped together, (but not assembled).
- If a built-in magnet cylinder without an auto switch is required, refer to the model of built-in magnet cylinder.

Applicable Auto Switch/Refer to page 6-16-1 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model: Band mounting (ø6, ø10, ø16)	Auto switch model: Rail mounting (ø10, ø16) Perpendicular	Auto switch model: Rail mounting (ø10, ø16) In-line	Lead wire length (m)* 0.5 (Nil)	3 (L)	5 (Z)	None (N)	Pre-wire connector	Applicable load	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	5 V	—	C76*	—	A76H	●	●	–	–	–	IC circuit	—
				2-wire	—	200 V	—	A72	A72H	●	●	–	–	–		Relay, PLC
		Connector			12 V	100 V	C73	A73	A73H	●	●	●	–	–		
					24 V	—	C73C	A73C	—	●	●	●	●	–	—	
	With diagnostic output (2-color indication)	Grommet					—	A79W**	—	●	●	–	–	–		
Solid state switch	—	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	H7A1	F7NV	F79	●	●	○	–	○	IC circuit	Relay, PLC
				3-wire (PNP)			H7A2	F7PV	F7P	●	●	○	–	○		
				2-wire	12 V		H7B	F7BV	J79	●	●	○	–	○	—	
		Connector					H7C	J79C	—	●	●	●	●	–		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)	5 V, 12 V		H7NW	F7NWV	F79W	●	●	○	–	○	IC circuit	
				3-wire (PNP)			H7PW	—	F7PW	●	●	○	–	○		
				2-wire	12 V		H7BW	F7BWV	J79W	●	●	○	–	○		
	Water resistant (2-color indication)						H7BA	—	F7BA	—	●	○	–	○	—	
							—	F7BAV	—	—	●	○	–	–		
	With diagnostic output (2-color indication)			4-wire (NPN)	5 V, 12 V		H7NF	—	F79F	●	●	○	–	○	—	

* Solid state switches marked with "○" are produced upon receipt of order.
** "D-A79W" cannot be mounted on bore size ø10 cylinder with air cushion.

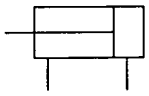
- Lead wire length symbols: 0.5 m ····· Nil (Example) C73C
  3 m ····· L (Example) C73CL
  5 m ····· Z (Example) C73CZ
  None ····· N (Example) C73CN
- Since there are other applicable auto switches than listed, refer to page 6-3-13 for details.
- For details about auto switches with pre-wire connector, refer to page 6-16-60.



Specifications

Action		Double acting, Single rod
Fluid		Air
Proof pressure		1.05 MPa
Maximum operating pressure		0.7 MPa
Minimum operating pressure	ø6	0.12 MPa
	ø10, ø16	0.06 MPa
Ambient and fluid temperature		Without auto switch: –10 to 70°C (No freezing) With auto switch: –10 to 60°C (No freezing)
Cushion		Rubber bumper/Air cushion
Lubrication		Not required (Non-lube)
Thread tolerance		JIS Class 2
Stroke length tolerance		$^{+1.0}_{0}$
Piston speed		50 to 750 mm/s
Allowable kinetic energy	ø6	0.012 J
	ø10	0.035 J
	ø16	0.090 J

JIS Symbol
Double acting,
Single rod



Standard Stroke

Bore size (mm)	Standard stroke
6	15, 30, 45, 60
10	15, 30, 45, 60, 75, 100, 125, 150
16	15, 30, 45, 60, 75, 100, 125, 150, 175, 200

* Intermediate strokes are available by the 1 mm interval with no stroke adjustment by spacer.

Made to Order Specifications (For details, refer to page 6-17-1.)

Symbol	Specifications
-XA□	Change of rod end shape
-XB6	Heat resistant cylinder (150°C) • Not available with switch & with air cushion
-XB7	Cold resistant cylinder • Not available with switch & with air cushion
-XB9	Low speed cylinder (10 to 50 mm/s) • Not available with air cushion
-XB13	Low speed cylinder (5 to 50 mm/s) • Not available with air cushion
-XC3	Special port location • Not available with air cushion
-XC8	Adjustable stroke cylinder/Adjustable extension type
-XC9	Adjustable stroke cylinder/Adjustable retraction type
-XC10	Dual stroke cylinder/Double rod type
-XC11	Dual stroke cylinder/Single rod type
-XC22	Fluoro rubber seals • Not available with air cushion
-XC51	With hose nipple

Minimum Stroke for Auto Switch Mounting

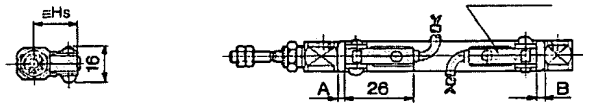
Auto switch mounting style	Auto switch model	No. of auto switches mounted	Minimum cylinder stroke (mm)
Band mounting style (ø6, ø10, ø16)	D-C7□ D-C80	3 (Same side)	90
		3 (Different sides)	55
		2 (Same side)	50
		2 (Different sides)	15
		1	10
	D-H7□ D-H7□W D-H7BAL D-H7NF	3 (Same side)	105
		3 (Different sides)	60
		2 (Same side)	60
		2 (Different sides)	15
		1	10
	D-C73C D-C80C D-H7C	3 (Same side)	105
		3 (Different sides)	65
		2 (Same side)	65
		2 (Different sides)	15
		1	10

Auto switch mounting style	Auto switch model	No. of auto switches mounted	Minimum cylinder stroke (mm)
Rail mounting style (ø10, ø16)	D-A7□ D-A80 D-A73C D-A80C	3	35
		2	10
		1	5
	D-A7□H D-A80H	3	45
		2	10
		1	5
	D-A79W	3	40
		2	15
		1	10
	D-F7□ D-J79	3	45
		2	5
		1	5
	D-F7□V D-J79C	3	30
		2	5
		1	5
	D-F7□W D-J79W D-F7BAL D-F79F	3	55
		2	15
		1	10
	D-F7□WV D-F7BAVL	3	40
		2	15
		1	10

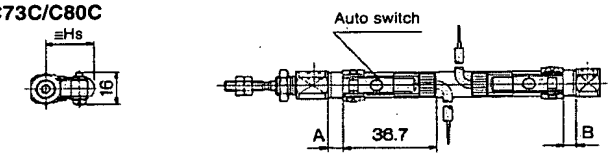
Proper Auto Switch Mounting Position (Detection at stroke end) and Its Mounting Height

Reed switch
<Band mounting style>

D-C7□/C80

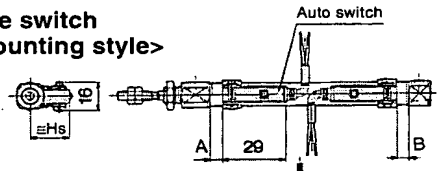


D-C73C/C80C

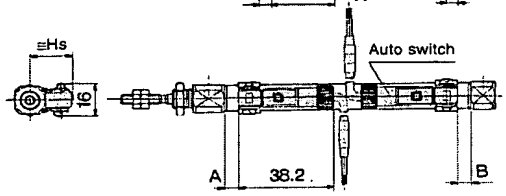


Solid state switch
<Band mounting style>

D-H7□
D-H7□W
D-H7BAL
D-H7NF



D-H7C



<Rail mounting style>

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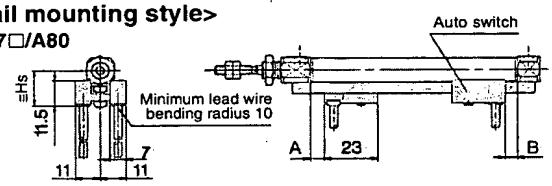
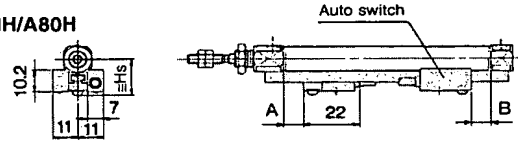


D-A7□H/A80H



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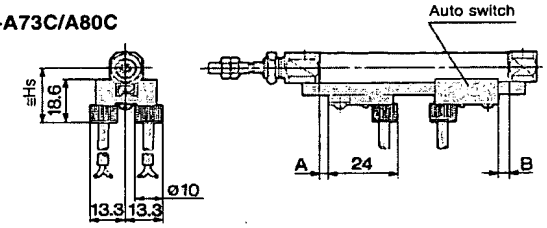
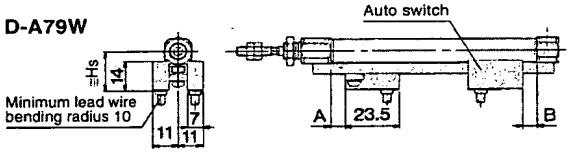
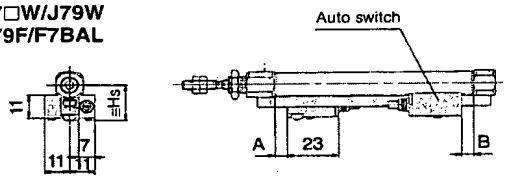


D-A79W

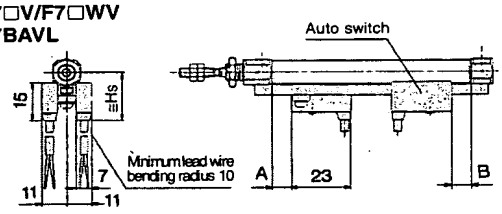


<Rail mounting style>

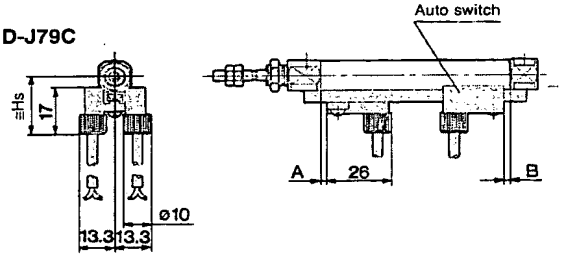
D-F7□/J79
D-F7□W/J79W
D-F79F/F7BAL



D-F7□V/F7□WV
D-F7BAVL



D-J79C



Annotated Sheet Showing Changes

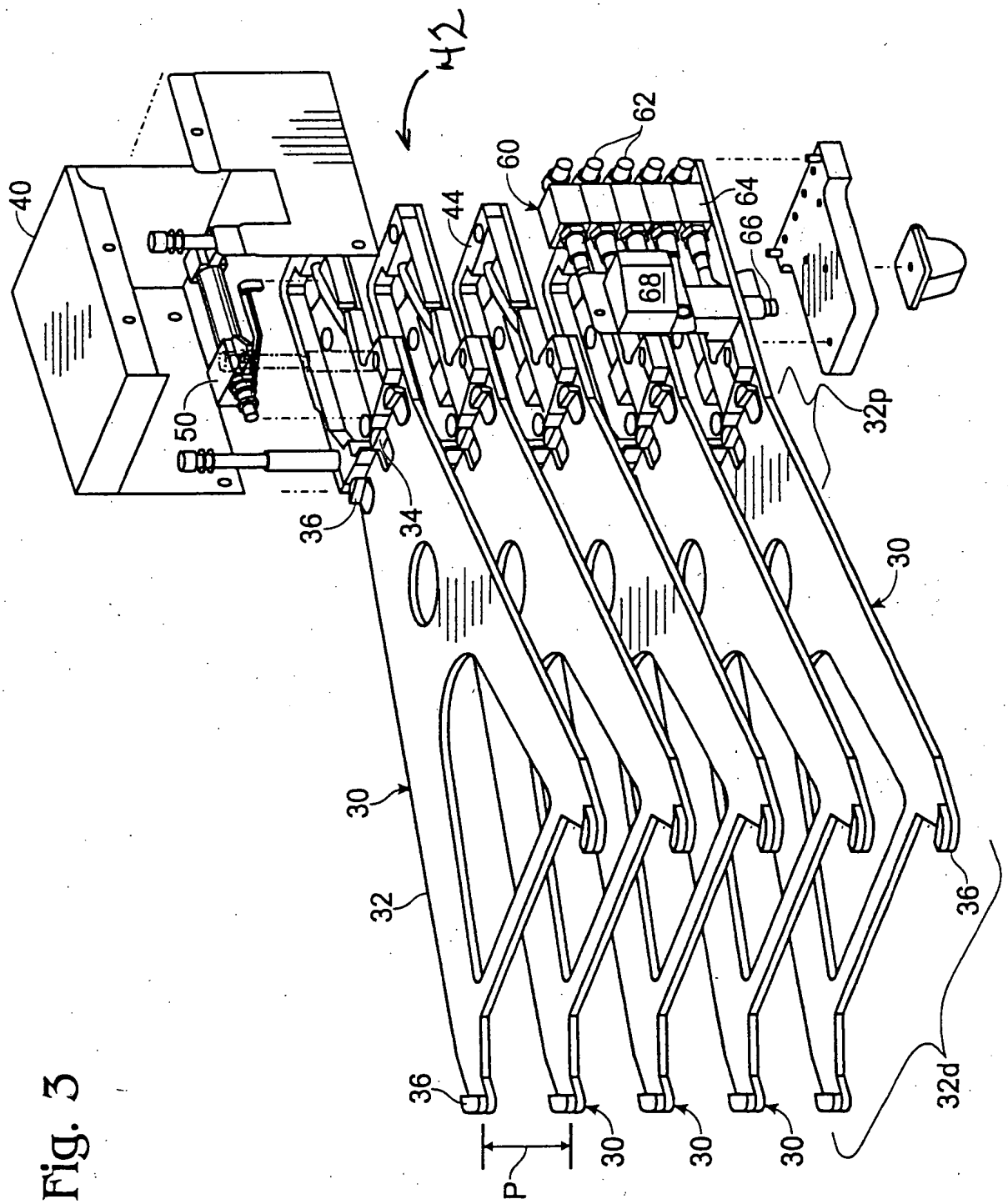


Fig. 3